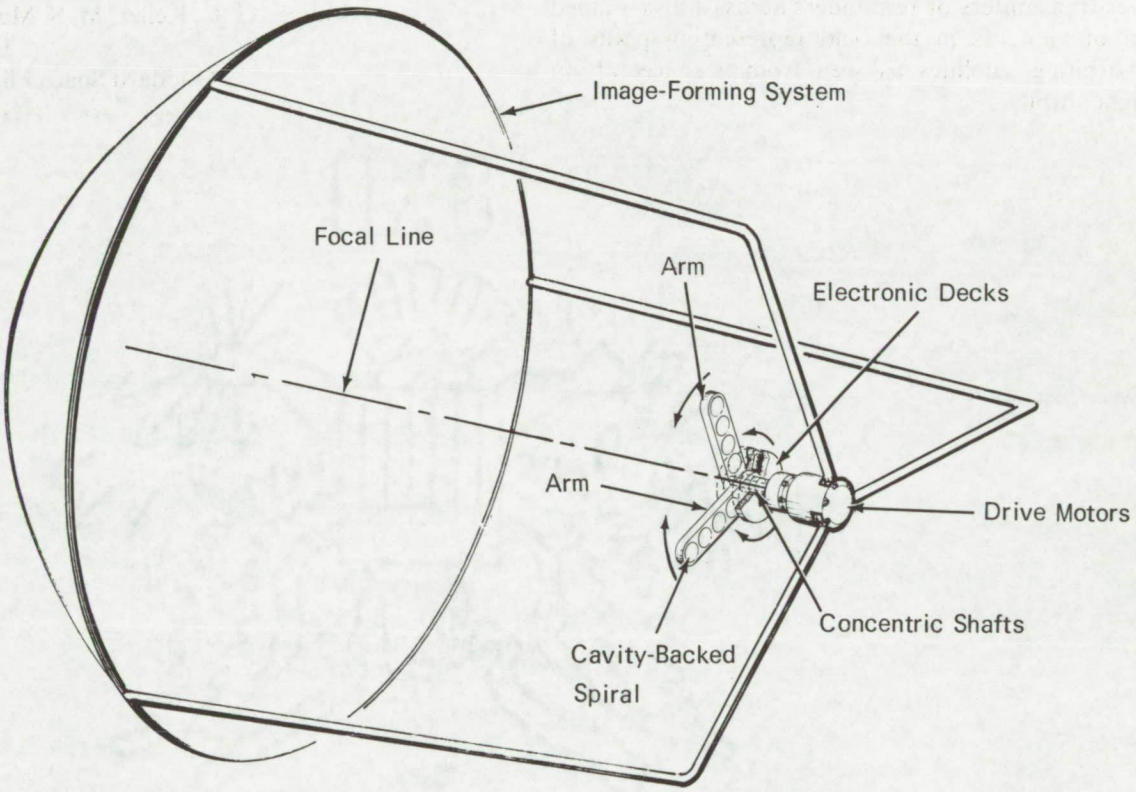
NASA TECH BRIEF
Goddard Space Flight Center

Radial Rotating Antenna-Feed System



A radial rotating antenna-feed system incorporating two or more radial feed assemblies is designed to track and communicate with multiple moving transmitters, receivers, or transponders. The system utilizes a fixed parabolic reflector or other beam-forming device such as a lens or spherical reflector.

The radial feed assemblies (see fig.) are severally equal in length and can rotate independently. Each feed in the assembly is at the required distance from the image-forming system or element as determined by the offset from the axis of symmetry, so that a feed at that distance forms the most desirable beam—maximum signal gain, minimum side lobes, etc.

The feed assemblies are located about the focal point of a parabolic reflector. Because of assembly thickness, one feed-arm is immediately inside the focal point and the other is immediately outside the focal point, along the focal line. Each radial feed assembly is composed of a number of discrete

(continued overleaf)

antennas (such as cavity-backed spirals, or horns) that can be switch activated and have overlapping radiation patterns. An associated electronic deck rotates with each rotating feed assembly, and more than one feed in each arm assembly can be employed simultaneously.

A target transponder is tracked using a combination of a given arm rotation and feed switching on an arm assembly. The angular coverage away from the reflector's bore sight is determined by the arm length and the corresponding acceptable signal gain. When two target transponders converge, the two signals are diplexed on the front arm (the one inside the focal point) until the targets diverge.

The new antenna system can be used for tracking and communicating with two or more moving receiver-transmitters or responders across a disk-shaped field of view, as in the field representing paths of low-orbiting satellites as seen from a spacecraft in a higher orbit.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
Goddard Space Flight Center
Code 207.1
Greenbelt, Maryland 20771
Reference: B71-10025

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to:

Patent Counsel
Mail Code 204
Goddard Space Flight Center
Greenbelt, Maryland 20771

Source: G. C. Keller, M. S. Maxwell, and L. R. Dodd
Goddard Space Flight Center
(GSC-11013)